

NASA TECH BRIEF

Goddard Space Flight Center



NASA Tech Briefs announce new technology derived from the U.S. space program. They are issued to encourage commercial application. Tech Briefs are available on a subscription basis from the National Technical Information Service, Springfield, Virginia 22151. Requests for individual copies or questions relating to the Tech Brief program may be directed to the Technology Utilization Office, NASA, Code KT, Washington, D.C. 20546.

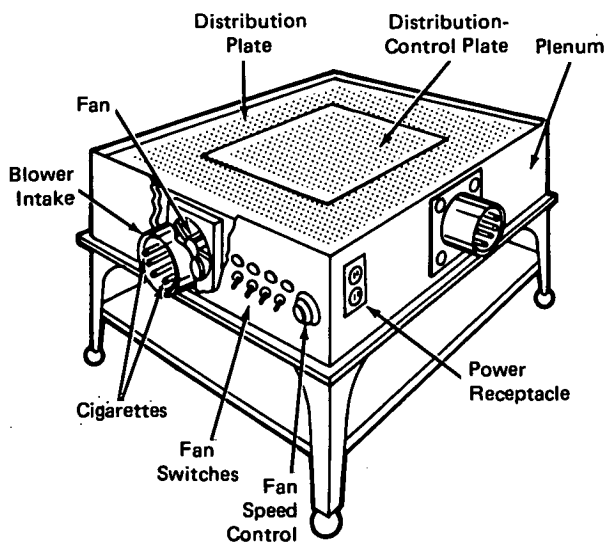
Combustion Products Generating and Metering Device

The problem:

Fire detection apparatus now is much more sensitive than the response of sprinkler systems. Sprinklers require such high heat levels for activation that fire causes considerable, if not total, damage to electronic and high-value equipment. To take full advantage of modern, ultrasensitive, fire detection devices, such as ionization detectors, their calibration and placement must be determined carefully and then verified by actual performance testing in the field. Other problems concerning moving air can be studied also, using smoke-laden air to determine airpaths and airflows.

The solution:

The combustion products generating and metering device (see figure) simulates incipient fire conditions in a closely-controlled adjustable manner, to give a pre-determined degree of intensity at selected locations throughout an area, to verify that the detection system will respond.



Combustion Products Generating and Metering Device

How it's done:

In the device and module illustrated, cigarettes are used to produce combustion products because cigarettes are readily available, the smoke is tolerable, and the burning rate can be controlled closely, although other combustibles with adapters also can be used. Four variable-speed, fan-operated modules are installed in a common housing plenum and may be used singly or in any combination, depending upon the volumes and concentrations of products required. The modules may be withdrawn from the machine and used individually if so desired.

The plenum is enclosed fully and is covered with a punched distribution plate that releases the smoke to the test area. A distribution control plate rests on the distribution plate, is consolidated with holes in a matching overlapping pattern, and is moved about as required to control the plenum-output volume and pattern. The quantity of combustion products and the ratio of dilution air are regulated at the control panel, to produce the precise mixture and volume of combustion products wanted for testing a given system or a specific detector.

For testing the response of individual detectors directly, a one-fan-operated module is so designed that it can be inserted directly over the detector. In order to avoid ultrasensitivity and false alarms, the fan is rotated (without any burning) to induce an air velocity with some vibration around the detector; and at those conditions the detector should not alarm. Then one cigarette is burned and the detector sensitivity is adjusted so it will not alarm; but when two cigarettes are burned, the detector will alarm. Thus, there is no necessity for electrical instrumentation to calibrate and positive detection is assured.

(continued overleaf)

The device can be used with and, for cross calibration and experimentation, in conjunction with commercially available products of combustion analyzing meters. Several other uses of the machine are possible:

1. Measured trace elements of products of combustion can be introduced into air and, with a commercial products-of-combustion analyzer, the airflow capacities of air-moving devices such as fans can be determined accurately, since the weight of the product burned can be obtained along with the concentration reading of the tracer smoke-air mix (weight per unit time burned divided by concentration per unit volume = airflow).
2. The machine can be used for air pollution studies, medical tests, and experiments.

Note:

Requests for further information may be directed to:
Technology Utilization Officer
Goddard Space Flight Center
Code 207.1
Greenbelt, Maryland 20771
Reference: TSP74-10036

Patent status:

This invention has been patented by NASA (U.S. Patent No. 3,729,979). Inquiries concerning nonexclusive or exclusive license for its commercial development should be addressed to:

Patent Counsel
Goddard Space Flight Center
Code 204
Greenbelt, Maryland 20771

Source: Richard E. Wiberg and
John A. Klisch
Goddard Space Flight Center
(GSC-11095)